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ABSTRACT

A writing instructor at a California University, assigned to teach expository writing in a science course, restructured the course before the third paper assignment to allow students to write, to discover, and explore ideas about science, rather than simply to learn standards of rhetoric or scientific writing. This assignment required students to define terms and clarify the ideas they had argued for during a class discussion. They were encouraged to deepen and expand their thinking by reading further and discussing their ideas with friends, leading to an exploratory essay that would not merely argue one-sidedly for ideas but lead toward illumination for the writer. The instructor and the students found the assignment very helpful, and discovered that some students changed their minds about their original ideas in the course of writing the paper. Students were then asked to write a paper about their own writing, which forced them to examine how their thinking evolved. The course, focusing on expanding on the ideas in essays rather than on close reading, created better, more analytical thinkers who began to see ideas as connected rather than discrete. (JC)

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From Self to World: An Exploratory Approach to Writing Across the Curriculum

There seems to be two prevailing modes of instruction in writing across the curriculum courses. One mode espouses instruction in the conventions, styles, and forms of a particular discipline -- e.g., Sociology, or biology -- to train undergraduates to become better writers in these fields of study. The other mode, advocated by many interdisciplinary readers, encourages cross-fertilization of ideas derived from different subjects to encourage and cultivate mature expository writing strategies in young writers. The former assumes that only through a careful training in discipline-specific techniques can a writer become proficient in making independent inquiries in a certain field; the latter assumes that all ideas form an interconnected network which the writer should learn how to plug into.

Curiously, what both modes seem to ignore is the writer's self. Methods of bridge-making or mediation between the writer as a unique subjective self and the worlds of disciplines or ideas are seldom suggested. This disjunction often creates either a rigid curriculum or a curriculum without a center which fails to engage the student's attention or enthusiasm. Things are not much easier for the instructor. In the first mode, she

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may find herself confronted with a series of discrete techniques or skills she is supposed to teach, often -- given her mostly humanistic education -- without even a memory of her own previous practice of many of these -- such as, a lab report, a scientific journal article etc. The problem with the second mode, both for students and teachers, is that its assumed purpose -- creating an awareness of a idea network -- hardly ever materializes. Students may write very interesting papers on science, politics, philosophy, or art, but they seldom see these ideas as interconnected or integrated in a universe of ideas. Far from connecting the tales of medieval pilgrims to modern algebra, as Whitehead suggests a good student of ideas should do,[1] they construe the world of ideas, as presented to them in ponderous readers, as a discrete series of intellectual artifacts for a supermarket-style random or exigent consumption. This description, of course, also applies to whatever transmission of knowledge takes place in the more skills-oriented classes.

One solution to such a lack of center or purpose -- attempted by many -- is to construct a theme-centered writing course. The main advantage of a theme course over a rhetorically structured one is (apart from the symbolic advantage of using real books rather than a reader) that it can engage the student's mind in a sustained way to important issues and thus allow for patterns of ideas to appear which could be very meaningful to the student. This, however, may not materialize

for students to whom the particular theme of a course is uninspiring. Secondly, theme courses rarely offer instructions in discipline-specific writing skills -- for example, writing a report, or a case-study.

There is, however, an alternative method of instruction which probably many instructors have occasionally stumbled upon while trying to follow one of the abovementioned approaches. This method allows the student to test and explore her own ideas first and then relate them to an existing body of ideas (tradition?) -- in doing which she naturally practices and perfects specific techniques and forms of inquiry in a particular discipline. Knowingly or intuitively this method uses insights from reader-response, speech-act, and other transactional models of reading and writing to create a context for the student reader and allow her to establish a bridge between self and the world. Both ideas and forms are important in this method. However, rather than emphasize "close readings" or appropriate format, the method elicits responses and creates a dialogical context in which an individual writer can examine, modify, and enrich her initial ("subjective") ideas and then select appropriate forms to encode or express it. The following narrative is an account of a writing course which, despite all prepation to the contrary, serendipitously found such a method. And the last section of the article tries to draw some generalizations from this experience for possible application to other writing-across-the curriculum courses.

I

English 131 is an advanced expository writing course offered to upperclassmen at UCLA in two forms -- regular and special. The special sections include business, law, health-care, fine arts, and technical writing. In Winter 1986, a section in science was first offered and the responsibility of teaching that class fell to my lot. The only text I adopted for this class was a collection of writings on scientific topics (articles and excerpts): Writing About Science , edited by Elizabeth Bowen and Joseph Mazzeo (Oxford University Press, 1979). Having only a layman's knowledge of science, I frantically perused all immediately available books and articles on science writing, and devised a rational enough sequence of papers to see us through the quarter:

1.Definition and classification.

2. Discourse analysis.

3. Review paper.

4. Laboratory report or journal article.

5. Writing for a popular audience.

For the first paper we discussed different types of definition -- logical, operational, stipulative -- and also the rules of classification -- inclusiveness, no overlapping etc. The assignment was to a) accurately classify a discipline (for example, Physics) according to its subdivisions and erect a tree structure to present the classification; and b) define a concept in one's field of study (for example, Relativity) to the

satisfaction of two audiences: the expert and the interested lay reader.

Continuing logically from this discussion of organizational and heuristic techniques as well as audience awareness, the second paper focused on the function of rhetoric in writing. We read three different texts (by James Watson, Garett Hardin, and Francis Crick and James Watson) on the same subject -- DNA research -- texts that were widely divergent in style, organization, and tone. The writing task was to examine how different elements of choice regarding style and organization were determined by the purpose of each text and predicated on differing relationships between the reader, the writer, and the subject-matter.

So far the course was going as planned and next in line were a review, a journal article, and an essay for a popular audience. The course was thus going to be one based on rhetorical considerations and application of rhetorical strategies to writing about science. But this is where the class took an unexpected turn, and took me and the students into uncertain, sometimes exasperating, but finally very rewarding explorations.

Intuition and problem-solving

One of the three texts we discussed for paper 2 -- James Watson's "Finding the Secret of Life" (an excerpt from The Double Helix) -- emphasized the non-rational and intuitive nature of many scientific explorations. Replete with phrases

like "vaguely dreaming", "tried to puzzle the mystery," "the answer suddenly hit me," and so on, Watson's text indicated that incubation of ideas and the workings of the subconscious mind have a major role to play in a scientific discovery -- especially since his initial "hunch" was opposed by some experts in the field, by many existing findings, and by "rational" expectations. At this time I also remembered a highly suggestive 1979 article by Gerald Horton on Einstein's model for constructing a theory, which explained that according to Einstein, scietific theory making, far from being a purely or even predominantly inductive process, depends on an imaginative leap from the world of observed phenomena to a yet unknown principle that would eventually unify and explain these phenomena.[2] Exactly how the leap from facts to principle takes place neither Einstein nor Horton offered to explain.

As a teacher of writing I found the implications of these articles to be of tremendous interest -- implications that could be used to explore the creative nature of thinking and writing. Thus I added an option to paper 2. Students could either do the rhetorical analysis or "describe a process in [their] own scientific studies or lab work by which [they] came to understand something [they] did not understand before" (option B). I reminded them that the Watson text could serve as a model for tracing thought processes as well as laboratory procedures. Interestingly, out of 16 students, 14 decided to write on option B, and only 2 did the rhetorical analysis. When asked why, the

majority replied that option B was more engaging, more relevant, and more fun to write about. Most of the papers narrated accounts of complex scientific problem-solving -- cross-hatching two kinds of fruit-flies to find out their precise genetic codes; devising a cheaper and better way of dispensing coke at MacDonald's; avoiding the "vortex effect" in preparing stained slides for cell analysis etc. In contrast to the academic neutrality of paper one, these were peppered with anecdotes, witty remarks, personal preoccupations, and accounts of frustration, boredom, as well as sudden intuitive grasp of the precise nature of a problem.

With paper 3 (Review), we returned to the initial design and intention of the course -- discuss writing techniques and assign a project to use those techniques. We discussed library search; note-taking; assimilation, arrangement and presentation of information; adapting technical details to the level of understanding of a presumed audience; use of headings, sub-headings, and visual aids etc. Most of the papers dealt quite competently with an area of current research -- summarizing and explaining the most significant findings.

Having analyzed a discipline according to its sub-fields, defined a concept, examined how rhetorical strategies can be applied to make writing effective, and reviewed a particular field of research, it would have been logical, at this point, to embark on writing the journal article. But two major

difficulties arose and changed the sequence of papers again, significantly.

II Difficulties/Explorations

The first difficulty would be shared by any teacher of science writing who is not also a scientist -- that is determining the worth of a scientific journal article for its content rather than for its format. There are many books devoted entirely to explaining how properly to write and format a scientific journal article. A non-scientist teacher can learn and teach these techniques and prescribe rules from these books. However, she will have no certain measure to assess whether or not the contents of student articles represent accurate (or original) scientific knowledge, or whether they are indeed plagiarized versions of any of the thousands of journal articles availble from scientific periodicals.

The second difficulty was even more compelling for me, having to do with two ways of teaching writing -- prescription and process. In a sense, all rhetorical strategies, like rules of grammar, are either prescriptive or merely descriptive. One needs to know the rules of grammar to use language correctly. But for native speakers, such knoweldge is better acquired intuitively. Similarly, definition, classification, comparison, structured problem-solving techniques, tagmemic heuristics, journal article format etc. are all ways of formulating the processes and conventions of the effective uses of language and

thought for writing more than they are means of teaching such uses. The pedagogical value of rhetoric, it would seem, is secondary, because rhetoric (the study of rules and principles of composition) is primarily a descriptive and analytical science. A good writer is one who has internalized these rules, but not necessarily through classroom instruction in rhetoric. To use an analogy, teaching writing by rhetorical models is like teaching biology by using only anatomy. Following a rhetorical or anatomical model, we can teach how to dissect another's writing, may be even how to diagnose certain illnesses (stylistic or organizational weaknesses) and prescribe cures (types of revision). But can we teach how an organism (writing) grows, where it finds nourishment, or how different organisms form an interdependent ecological unity?

With these semi-articulate thoughts passing through my mind, I faced a genuine crisis in teaching. I had undoubtedly abandoned the journal article from my plan, and yet could not think of an alternative assignment. I had to think very quickly for an entirely new calendar for the remaining half of the quarter. Basically, I was seeking to replace the analytical approach of using external models in teaching invention, by something more organic, synthetic and internal -- something enabling the writer to begin from self and extend outward rather than begin from outside and try to fit ideas to a prescribed mold.

I selected two articles from the anthology -- Rachel Carson's "The Obligation to Endure," (an excerpt from Silent Springs) and Julian Huxley's "Evolutionary Progress." Huxley discusses the confusions that arise in defining progress as a scientific concept, especially as a biological concept, because many other misleading concepts -- "survival," "specialization," "adaptation," etc -- are usually associated with progress. He then covers an enormous amount of intellectual territory -- nature and mechanism of evolutionary progress, past course of progress, progress and the evolutionary future, the question of purpose and values -- to redefine evolutionary progress as an advance by the organism from lesser to greater control of the environment, and from lesser to greater independence. Progress, according to him, creates purpose rather than vice versa, and he considers the future of human progress as problematic because humanity has not yet established a consistent purpose for all, and because humanity is still experiencing sharply polarizing struggles between opposed ideals -- for example, freedom of the individual versus collective welfare, and a future based on progress in the existing world versus future directed to a supernatural world. In contrast to Huxley's dualistic (organism/environment), anthropocentric and future oriented vision is Carson's plea for interdependence between environment and organism and for the welfare of all life. For her, excessive control of the environment results in mass destruction, and rather than affirm the advancement of human intellect with a

prediction for an even more glorious future for humanity (once it has resolved some conflicts), she would rather go back to a time when humanity had a saner and closer relationship with nature. The main reason for selecting these articles were of course the centrality of evolution as a controlling idea in the life sciences and the topicality of environmental pollution.

However, I had no clear sense of the types of writing assignment that could be assigned on these topics, nor did I intend to deal with these essays by emphasizing close textual analysis, because to do so would have put into operation the kind of directed and controlled reading which I was trying to avoid for the time being. I decided to let my students know what I thought the articles were saying and how, but also greatly encourage them to come up with their own readings -- even if their readings may have seemed "incorrect," or brought up "tangential" issues.

The results of discussing these two articles in this were twofold: i) students read the essays without trying to correlate or connect sets of ideas under a greater idea; and ii) they brought up issues which were important to them and in their own experiences rather than to Carson or Huxley. While in my mind the two articles were representing two contrasting modes of relating to nature, and thus two contrary views of the role of science and the place of humanity in the grand scheme of life, to the students these two pieces were more or less unrelated.

Trying to approach these texts from points of view based on

their own experiences, students offered a number of contradictory observations:

1. Carson's cautionary tale is highly thought-provoking and relevant. Recalling her use of lines from Keats's "La Belle Dame Sans Merci," as epigraph, one student pointed out that we are too engrossed in our enchanting dream of technological progress to realize that all life is withering away.

2. Conversely, another student said that environmental concerns expressed in emotional terms as Carson's are "games" played by "the liberals" to influence political decisions.

3. Humanity's progress is evident from history, and it can be related to what Huxley calls "evolutionary progress," but Huxley's faith in evolutionary progress -- despite his arguments -- is not a scientific concept, but an article of faith.

4. Progress is most evident in technology, and technology, while creating some problems, is on the whole a force for amelioration.

5. Creationism is just as valid a way of explaining the origin of life as evolution theory -- since both science and religion are actually coherent "belief-systems" each valid in its own sphere.

6. Science offers theories that can never be absolutely proven. In that respect science is not

qualitatively different from religion, although it has more quantitative precision in predicting events.

Faced with such conflicting assumptions about fundamental issues, conflicts which could not be resolved by usual class discussions, the only course open was to elicit more clarification and definition of these assumptions. For example, the student who said that expressing environmental concerns was a "liberal" game was asked to further define his concept of "game" -- to answer questions such as who are the players in this game; what are the stakes; how playful or serious is the game; does such game-playing reveal deeper and diverging spiritual, psychological as well as political commitments by the participants on both sides etc. The students who said technology, despite its problems, is an agency of progress, were asked to elaborate on their notion of progress. Is progress an increase in efficiency, or also an advancement of social and ethical ideals? Has technology advanced our moral and spiritual life, or has it estranged us from such environment with which we should be familiar? Students who thought science and religion were both "belief-systems" were asked to define all these terms -- science, religion, belief-system -- as carefully and concretely as possible. At the same time I also encouraged everyone to read more on the issues in which they were interested and suggested some readings -- for example, Whitehead and William James on belief, religion, and science; Barry Commoner, E.F.Schumacher, Paul Goodman et al on technology and

the environment; Gregory Bateson on mind and nature and so on.

III Relativism v/s Presuppositions: Emerging Patterns

What emerged from these class discussions is that although our upperclassmen are mostly intelligent and dedicated learners and are already beginning to develop specialized knowlegde in many different areas, they, by and large, have not yet begun to enter a discipline for the simple reason that they are unaware of many of the underlying presuppositions of almost any discipline -- of religion, or science, or politics -- presuppositions which when carefully considered and reconsidered can give one's knowledge and investigations a unifying structure, and a vision. Many eduactors today have no doubt noticed that for whatever socioeconomic reasons, students are asked to continually absorb diverse, fashionable, and readily applicable types of knowledge which somehow remain disconnected or fragmented in the student's mind. Indeed, a noted scientist attributes this lack or loss of vision to "the very origin of modern science" which emphasizes "the primacy of efficient causes" and discourages any serious consideration of "final cause or purpose. [3] One result of this one-sided emphasis in education is a classroom that considers discussion to be arguments for one's beliefs rather than a dialogue leading to mutual clarification and illumination, to birth of new ideas. Since few proceed from coherent and conscious presuppositions about any particular body of knowledge, few can prove others

right or wrong except in terms of "I feel" or "I think." And since the students themselves are intelligent enough to sense how thin the foundation of many of their opinions is, they very generously allow for a kind of radical relativism in which any opinion is as good as any other, any point of view is as valid, "at least theoretically" some would interject, as any other.

It was easy for me, now, to decide, on the basis of our readings and discussions, what an appropriate and useful writing assignment would be. Definition, again. But this time the definition would not follow the procedures we discussed before -- logical, operational, stipulative etc. -- but would emerge from careful thinking about concepts, and from balancing, modifying, and enriching one's own thoughts not only by the thoughts of others, but also through some related reading and research. I assigned the following topics, with accompanying suggestions, for paper 4:

TOPICS AND STRATEGIES FOR PAPER 4

WRITE ON ONE TOPIC

TOPIC 1: PROGRESS

Values and PURPOSE are central to Huxley's vision of the future progress of humanity; he also indicates two major obstacles in achieving a consistent human purpose (Writing About Science , p. 272, paragraph 4).

There have been many other concepts of progress -- for example, the Christian view of progress as an ongoing

battle between the good and the evil ending with the victory of the good in a kingdom of God; the Marxist concept of history as dialectical materialism and attendant class conflict leading to an eventual abolition of the classes etc.

How would you define PROGRESS? Is there a major place in your scheme of progress for human values and purpose? Why or why not?

TOPIC 2: RELIGION AND SCIENCE

Write a precise definition of religion and a precise definition of science. Then show correlations between them, or contradictions, that emerge logically from your definitions.

In the above two topics you are engaging in defining a complex concept or issue. However, this definition is very different from defining Biology or even Democracy for both of which there are fairly commonly accepted ideas.

Such consensus would be hard to find in exploratory definitions like the ones for topics 1 and 2. I suggest the following strategies for composing on these topics:

* Write out the definition you have in mind. Do this without using a dictionary or a reference book.

* Ask several people -- friends, classmates, relatives, neighbors -- to comment (preferably in writing) on your definition.

* Study the comments and try summarize them. In particular, look for the following kinds of anomalies:

a) The boundaries of the definition are fuzzy. People don't know what is excluded or what is included.

b) Connotations are wrong or confusing, which cause people to have improper attitudes toward the things the word stands for.

c) People differ in what things they apply the word to.

d) The definition popularly given in the dictionaries or elsewhere is not the one people actually use.

* Look up the word in several dictionaries and encyclopaedias.

* Find and read at least two good essays on your topic.

* Make a list of things that the word stands for. Also list some things that are closely related but that your word does not stand for.

Now write an exploratory essay.

The strategies for redefining as a way of composing were taken from an exercise in a composition textbook.[4] But we also discussed the nature and pupose of expository writing at great length in preparation for writing on this assignment. The papers

I received were without exception thoughtful and perceptive. Some had uneven or incoherent passages because diverging thoughts or ideas were not harmonized, but everyone was refreshingly engaging, projecting an authentic voice. Above, I provided, in my own words, some samples of student responses during class discussions. Below, I would quote or paraphrase (to save space) passages from some of the same students, passages that indicate to what extent their thoughts and ideas evolved in the process of writing.

The student who thought technology is by and large an agency of progress came to see it as a double-edged tool cutting both ways -- the user and the used, for better and for worse. His final reflections were:

> I believe progress is a natural consequence of the curiosity, imagination, and the inventiveness of the human mind. The seeds of progress might have been fanciful notions in the minds of men and women with imaginative visions, but when they were realized, their results were marked and far-reaching. This may be said of the foresight of the men and women who set out to colonize North America on the Mayflower , or of Eli Whitney who invented cotton gin. The descendents of the pilgrims eventually sought self-determination and independence from Great Britain. Two of the important results of their achieving these goals were the birth of the United

> States and the weakening of the British Empire. Eli Whitney's goal was a more efficient way to harvest cotton. The consequences of his invention involved a complete overhaul of the social and economic structure of the South. Thus, how we see progress will depend on our personal views and values. We must ask, "Why is this change being made?", "Is it really necessary?", "What will be the consequences?", and answer these questions for ourselves. For example, we can consider the proposed spaceplane in these ways. Especially as we grow older, we often long for the "good old days," when life was "better" before all the changes....The changes we create from the old to the new make up our future. There would be no future without them. There may be no future because of them.

One of the students who equated religion and science as "belief-systems" wrote a lengthy passage on the same issue which, condensed and paraphrased, would read like this:

> Science cannot accurately be described as a belief-system in the same manner as religion, since the scientific method involves verification of hypothesis by observation and experiment. And although science cannot lay claim to an absolute proof once and for all, it approaches truth the only way it can -- by successive approximation. Indeed, absolute proof is not a scientific concern. What can never be falsified,

can never, by the same token, be verified: for example, the existence of God.

Of the several very interesting papers on science and religion, I will quote only one rather long excerpt from a four page paper:

> Scientific thinking has dominated our mind only recently. A few hundred years ago, men started to use the scientific method to find explanations for the unknown. They strived to find the complex explanations to simple phenomena, understand them block by block and thus expand knowledge. They recognized the complexity and interdependence of the environment, but knew that by careful dissection the building blocks could be found and subsequently a coherent picture of the complex whole could be at least sketched. There was no need to seek the ultimate formula because it would be difficult to understand how it related to smaller building blocks and how it applied to daily phenomena.
>
> Unlike religion, science has no ultimate goal or utopian ideal, but it has a direction toward further probing. Science knows that singling out one aspect of the complex whole will not suffice for proper explanation, that one needs to understand how one piece relates with the rest and fits in the delicate

> balance. If the complex set of interrelationships changes at a faster rate than our ability to understand them, we might never solve the puzzle....
>
> Religion and science are both products of man's attempts to understand his environment. Science dominates the present with its rational inquiry, but some people do not find it adequate. A lifetime could pass before science makes a leap, and understanding the complex whole may literally take forever, especially since the further we probe, the further we appreciate the magnitude of what lies ahead. Thus, some poeple turn to religion to provide them with daily reassurance. Of course, in view of current scientific knowledge, not many people may believe in the sun god. However, they may believe in reincarnation since the idea of recycling is found commonly in nature, although reincarnation cannot be physically tested. Other people treat science as their religion, by devoting their lives to scientific research or reading about it as often as a religious person would read a holy scripture.

In comparing students' responses during class discussions with the final drafts on paper four, one conclusion was clear. Whereas the class discussions were mostly an airing of personal views and opinions with much rationalization, the exploratory

process which preceded the final writing either connected or modified these opinions and views in a larger context of ideas, and thus made them more systematic and coherent, more tenable to a community of readers.

The writer of passage A who at first considered progress as technological and scientific improvement, arrived at a finer, broader and more balanced perspective. As his last few sentences suggest, through an almost inexplicable shift in thought, he arrived from a kind of naive materialism to a rather sophisticated view of history as a remarkable but precarious creation of human imagination. The second writer, who turns 180 degrees in his assessment of science as a belief-system, does not show a qualitative change in thinking as much as a change of opinion from an egocentric equivalence of categories to more discipline-specific differentiation, thus acknowledging that there are basic presuppositions on which a coherent body of knowledge can be built. In this he was probabay influenced by a majority consensus in the class as well as by his own reflections. Passage C demonstrates how a knowledge of the basic presuppositions of a discipline can give one a greater understanding of the discipline and its aims and modes. His understanding of the scientific method imparts the writer of passage C also an understanding of the greater aim of science -- a systematic and coherent description of nature and the universe. This, in turn, enables him to contrast as well as correlate religion with science. In religion he finds "utopian"

tendencies toward perfection, and the absolute, which science, as science, does not exhibit. The necessary incompleteness of science, according to him, thus makes religion a perennial rather than an obsolete human concern. Emboldened by the efficacy of his speculative heuristics, this writer then takes even greater risks in concluding the paper -- risks that, alas, have occasionally produced mangled or unclear sentences. The point, however, is the taking of risks. When a student knows that her ideas and concepts, originating from an individual nexus of meaning, can also be meaningfully correlated to an external universe of discourse shared by many -- through a knowledge of presuppositions or axioms, through strategies of exploration -- she would take more chances at creating new and newer patterns and would disregard some failures as necessary trials on the way to create meaning for self and others.

IV: Meta-awareness: Reading one's writing

The last writing assignment of the course also elicited a sense of personal engagement with cognitive and rhetorical strategies. We read a chapter on the scientific method from a book by Bertrand Russell and the following writing task was assigned:

Assignment #5

AN OBSERVATION OF THE WRITING PROCESS

Write a short analysis of your own writing process. Can you draw conclusions about writing from what you observe? (As Louis Agassiz said, "Facts are stupid things until brought into connection with some general law.") In attempting this analysis use your own writing as primary data (preferably the last paper).

Observe and make notes on the following:

How long did it take you to get your initial ideas?

Did ideas lead to words/did words lead to ideas?

Did you change ideas in mid-sentence or mid-passage?

How many times did you write the first draft?

Did you write the entire draft from beginning to end or was the process more complex?

How did you proceed from paragraph to paragraph? What kind of connections emerged to hold the paper together?

When did you begin to have a sense of the whole piece as a unified entity?

If the piece remains ununified or somewhat fragmentary in your mind, where are the missing links? What will you need to fill such gaps?

Did class discussions and/or readings feed into the writing? How?

How satisfied are you with your writing and why?

> Once you have written this analysis, try to compare your writing process with the scientific process Russell describes. What similarities do they share? What differences are there?

Despite my misgivings about the abstract nature of any writing task involving meta-awareness of writing skills, this assignment was extremely well-received. Several students immediately expressed the opinion that this was going to be a very educational assignment and may teach them a new method of analyzing and completing a writing task. Nevertheless, the first drafts were surprisingly general, lacking in significant details or reflections, and somewhat reductive. Except for one or two students, others approached the assignment by devising a formula for writing -- usually brainstorming, note-taking, writing and revising -- and claiming that this method, which they always employ, has similarities with the scientific method of arriving at a hypothesis, and observation and experiment to verify, modify, or discard the hypothesis. This analogy they were then urged to suspend until they actually look at their drafts and their succesive revisions closely and inductively (without a formula, if possible), to find out what actually happened, and to answer as many of the questions the assignment posed regarding the writing process in as much detail as possible. We also discussed Louis Agassiz's fish-story to emphasize the need for observations unclouded by preconceptions. There were

grumbles ("I don't really know what you are getting at." "What do you want?"), but, happily, almost everyone made a genuine effort to see their own writing with a fresh eye. The revised drafts fell into two, not mutually exclusive, categories: papers that explored the evolution of ideas; and papers which dealt more with writing techniques. I will briefly discuss one of each kind.

The first of these writers detailed how starting from simpler ideas he developed his thoughts by means of readings and reflections and eventually formed a strong thesis. In the course of his readings he intuitively accepted certain ideas to be true or valid, such as William James's notion that all religions are based on the reality of the unseen, and rejected certain others, such as Russell's rather positivistic black and white distinction between religion and science. Then he posed this question:

> I had observed facts [passages] and created a hypothesis [thesis] -- but was it testable? Of course there is no exact way to pin down an exact number or measurement with any of these thoughts. So I found myself faced, in essence, with the same problems as the theologian. I had beliefs and feelings which I considered very important, even vital, to my existence as a moral human being, and yet, there was no way I could "test" or "prove" them. Like the theologian I will have to rely on the power of my written or spoken

words to convince others of my belief.

This realization led this writer to examine closely his arguments and make them as coherent and systematic as he could by following the Toulmin model which we discussed in class. He then reflected on the meaning this experience had for him:

> While I may have used a somewhat scientific process of examining passages and hypothesizing to help thrust my beliefs into written existence, I somehow felt that there was more emotion involved than the scientist would ever invest. I cared about my feelings. As I tested each hypothesis I eagerly awaited a conclusion. Does the scientist ever care this much about his work? You know, on second thought, I truly feel that he does. While the answers to his questions may not necessarily guide him to a more religious life, they do serve to add order to his environment. With each discovery he gets more insight into the internal structures of a meaningful event -- he discovers something that was only seconds earlier considered to be "unseen."

While the first writer grappled with ideas and their coherence and significance, the second writer gave more attention to technique:

> In my first paper, I had such useless timber as: "Multiplication is a high powered form of addition; so much so that it is possible to perform multiplication by repeated additions." Now, I would instead say: "Multiplication is a high powered form of addition, because it is possible, by repeated addition, to multiply." .... I find myself writing now with a two-fold aim: to write economically (but not lose meaning) and to include relevant details (but not be verbose). Trying to write too economically, one may leave out key ideas. Trying to write too explicitly, one may very well loose the reader in a morass of verbiage. So I think of writing as steering a course between Scylla and Charybdis. But if these two principles are invoked, they become as two hands pressed isometrically against each other. The writing becomes taut like the muscles in one's arms, or like the strings of a guitar when it is tuned to a concert pitch.

There follows a brief quantitative analysis of "fog index" in the four papers he has written so far, showing that the fog index in his writing has "stabilized" -- "but not until after I oversimplified the second paper and made the third paper much too dense." Then, in his concluding paragraph, he uses the guitar image again, beautifully, to express his idea about the nature of artistic communication:

All art has a theme or central purpose that must not be obscured by its medium. It is far better to hear guitar music when the fingers of the left hand are placed firmly against the fretboard, and the fingers of the right hand pluck the individual strings with intent and purpose. If the transtions between the fingerings are not quick, smooth and quiet, then the music sounds rather like someone making an attempt at music . Writing is the same, in that the words must enjoin the reader to the ideas . The structure must possess a unity and purpose. The transitions between ideas must be smooth, because the reader, like the musician's audience, must be convinced that he or she is not really reading , but rather listening to the ideas. For in the same way that the buzzing of the guitar strings disconcertingly reminds the listener that he is hearing a guitar rather than music, the reader will be reminded that he is reading prose and will quite possibly lose interest in the thought the author had hoped to express.

V. Conclusion

Thus, as the course progressed, the course content evolved and the sequence of papers were changed more than once. On

retrospect, this class could probably have been approached in several other more productive ways. Yet several observations can be made about the significance of this experience in the context of writing courses, especially writing across the curriculum courses:

A. Close reading versus creating context through inquiry and dialogue : Frequently, writing teachers lay great emphasis on close reading -- often meaning textual analysis to arrive at a specific meaning -- as a means of cultivating and training the student's critical intelligence which in turn will supposedly enable the student to write more maturely and critically. Yet this is mostly an unexamined assumption, derived mainly from the new critical orientation of most of our literary studies, and its applicability to non-fiction or philosophical texts (here denoting all essays, articles, reports, or excerpts on different subjects and from differnt disciplines) can be questioned. It can be argued that applying close reading to Plato's "Allegory of the Cave," that perennial favorite of freshman composition classes, will not improve a student's understanding of Plato's epistemology or of the significance of his philosophical views in Western intellectual history, though it might teach the student something about the uses of extended analogy. Outside a context of literary explication, then, close reading has limited value and should be supplemented with other cognitive methods of assimilation and exploration, for example, exploration of ideas in a group setting, and dialogical or dialectical refinement of

ideas. The papers I received from my students on "progress" and on "science and religion," discussed above, indicates how such exploratory processes can enrich writing.

To take "Allegory of the Cave" as an example again, instead of focusing mainly on the allegorical nature of the piece, an instructor can also invite student responses to questions like these: i) What is reason according to you, and how does Plato define the term? ii) What assumptions about human reasoning and human nature does Plato make? iii) What, according to you, does Plato mean by the Idea, and how does his conception of the ideal state correspond with and differ from your own ideas about good government? iv) What kind of education do you think is Plato advocating, and how does that compare with the state of education now? etc. Secondly, to make this reading of Plato even more illuminating, the instructor can also assign readings that implicitly or explicitly convey a very different political and educational ideology, for example, E. M. Forster's "Two Cheers for Democracy," or Karl Popper's "Utopia and Violence." [5] Comparing the views of either of these two modern writers with Plato's will take the student a step beyond establishing personal relevance for Platonic philosophy, which the previously suggested questions intend, to seeing Plato as forming one segment of a spectrum of our intellectual heritage. This realization will have two salutary effects on the student reader: i) it will demystify authority, since all authorities deal with segments of reality and none can offer the final word

on many truths, and ii) it will make students aware that ideas are seldom, if ever, discrete, but are interconnected systemically in diverse relationships of compatibility, contrast, or complementarity. But beyond the personal and the contextual, this kind of reading may even lead to a third level of awareness: historical. For example, in light of the student's comprehension of Plato's and Popper's views on reason, knowledge, and political ideals, she can be asked to examine historical events, social issues, or even personal conflicts and assess which ideas are more valid. This is historical reading in a root sense, since the Greek word historia means a learning or knowing by inquiry. As Herodotus is known to have said, history is the act of finding out for oneself what is said.

B. Relativism versus emerging patterns : The effect of contextual and "historical" reading on one's thinking and writing should be obvious at this point. Instead of grappling with isolated texts with often discrete or unengaging bodies of meaning, the student begins to perceive patterns of ideas and events by which she can then locate herself in a particular communication role and find an authentic voice. Relativism or uncertainty gives way to knowledge of basic presuppositions and patterns which can then be further developed or explored. For example, a careful consideration of Plato in context can lead the student to an awareness of dialectics in the realm of ideas: idealism versus pragmatism, rationalism versus empiricism etc. Such awareness can also enable one to see similar patterns in

different disciplines: the conflict versus the consensus model in sociology, linear versus cyclical views of history, teleological theologies versus theologies of presence in religion, bioregional communities versus colonial communities in ecology and political science and so on. What is more, the student may even connect these polarities across the curriculum in such a way, for example, that idealism, teleology, linear view of history, and colonialism may line up on one side vis-a-vis pragmatism, presence, a bioregional ethic, and a cyclical view of history. Of course, there will be many bafflements when such neat divisions will not work. But it is precisely those moments of confusion or aporia which may lead to new insight, and to a progressive refinement of one's knowledge.

C. Finding form through content : A contextual and "historical" reader will read his own writing contextually and thus will become and remain aware of the reader and of the forms which are necessary to encode her message most effectively. The example, in scetion IV, of a student who, after realizing that his discourse is both speculative and argumentative, chose to make his writing as rigorous as possible by using Toulmin model of argument, is a case in point. For a student who engages with her writing in this way, form becomes a natural extension or circumference of content rather than a mold attained laboriously through exercise of certain techiniques. All writing techniques -- definition, argumentation, analysis, analogy, technical

report designs etc. -- are important tools of the trade that should be treated as tools rather than ends in themselves. Our objective is not primarily to teach isolated techniques, but to give the student a sense of intellectual forms and systems which define our shared reality, and for the exploration of which she can use these tools.

NOTES

[1] Alfred North Whitehead, "The Aims of Education." In The Aims of Education and Other Essays by Alfred North Whitehead (Macmillan Publishing Co., Inc. 1929).

[2] Gerald Holton, "Constructing a Theory: Einstein's Model." In American Scholar, Summer 1979, 309-340.

[3] Robert Morrison, "Visions." In Technology and the Future, fourth edition, edited by Albert H. Teich (New York: St. Martin's Press 1986), 7-20.

[4] James L. Kinneavy, William McCleary, and Neil Nakadate, Writing in the Liberal Arts Tradition (New York: Harper & Row 1985), p. 201.

[5] E. M. Forster, "Two Cheers for Democracy." In The Abinger Edition of E. M. Forster, vol. 11, edited by Oliver Stallybrass (London: Edwin Arnold 1980). And Karl Popper, "Utopia and Violence." In Conjectures and Refutations: The Growth of Scientific Knowledge (Basic Books, Inc., Publishers 1963).